A QUALITY IMPROVEMENT INITIATIVE TO IMPROVE USE OF MOBILE HEALTH APPLICATIONS FOR ADJUNCTIVE TREATMENT OF ANXIETY IN AN OUTPATIENT ADOLESCENT SPECIALTY CLINIC

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ABSTRACT

William Woodfin Crosby: A Quality Improvement Initiative to Improve Use of Mobile Health Applications for Adjunctive Treatment of Anxiety in an Outpatient Adolescent Specialty Clinic (Under the direction of Jennifer D'Auria)

Anxiety is a significant mental health issue affecting approximately one-third of American adolescents and young adults (AYA). Anxiety is often untreated in this population thereby increasing their risk for the development of secondary mental health disorders and substance abuse (Keesler, Ruscio, Shear, & Wittchen, 2010). Mobile health (mHealth) applications (apps) have been broadly supported as an effective treatment option and recommendations for use are well received by AYA. Unfortunately, many providers have been hesitant to include mHealth apps in their treatment plan. Providers seeking to incorporate mHealth apps into daily practice report multiple barriers to include: the overwhelming number of mHealth apps, lack of familiarity with mHealth apps, uncertainty in how to recommend mHealth apps to patients, and time constraints. Studies have demonstrated success in overcoming these barriers by seeking provider input early in the mHealth app selection process, creation of educational material, and implementing a standardized workflow protocol (Aitken & Lyle, 2015; Higgins et al., 2019; Hoffman et al., 2019; Owen et al., 2018). An outpatient adolescent specialty clinic in NC sought to increase the percentage of AYA with anxiety symptoms who received a mHealth app recommendation from their provider. Using the Model for Improvement (MFI), an evidence-based protocol was implemented to select high quality mHealth apps and standardize workflow when recommending mHealth apps to AYA with symptoms of anxiety.

During the quality improvement (QI) initiative there were 57 patient visits of which 38 AYA with anxiety symptoms were identified. This QI initiative resulted in providers documenting a clinical decision regarding mHealth apps during 76% of visits and recommending a mHealth app during 18% of visits with AYA with anxiety symptoms. This QI initiative demonstrated that early provider involvement in the selection of mHealth apps and implementation of a standard workflow protocol increased the percentage of patient visits where providers considered mHealth apps in the treatment plan for AYA with anxiety symptoms.

The views expressed in this dissertation are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the U.S. Government.

This is dedicated to my soul mate Jaime, awesome son Finn, and favorite daughter Tatumn.

Tatumn, your kind nature is contagious. Watching you explore the world around you with wonderment is a constant reminder to relax and enjoy life. You are the best parts of your mother and me. You are smart, kind, beautiful, and loved!

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LIST OF ABBREVIATIONS

APA	American Psychiatric Association
apps	Applications
AYA	Adolescents and Young Adults
AVS	After Visit Summary
DNP	Doctor of Nursing Practice
EMR	Electronic Medical Record
GAD-7	Generalized Anxiety Disorder 7-item
LCSW	Licensed Clinical Social Worker
MARS	Mobile App Rating Scale
MFI	Model For Improvement
mHealth	Mobile Health
PDSA	Plan, Do, Study, Act
PHQ-SADS	Patient Health Questionnaire – Somatic, Anxiety, and Depressive Symptoms
PNP	Pediatric Nurse Practitioner
QI	Quality Improvement
UNC	University of North Carolina

CHAPTER 1: A QUALITY IMPROVEMENT INITIATIVE TO IMPROVE USE OF MOBILE HEALTH APPLICATIONS FOR ADJUNCTIVE TREATMENT OF ANXIETY IN AN OUTPATIENT ADOLESCENT SPECIALTY CLINIC

Introduction

Anxiety disorders are the most prevalent class of mental health disorders experienced by adolescents. Approximately one-third of Americans younger than 18 years of age meet diagnostic criteria for anxiety disorder, with 8.3% of those adolescents experiencing severe impairment (Merikangas et al., 2010). It is estimated that almost 50% of adolescents in the United States with a mental health disorder do not receive treatment (Whitney & Peterson, 2019). That rate is significantly higher in North Carolina where 72% of adolescents with a mental health disorder do not receive treatment (Whitney & Peterson, 2019). Early initiation of anxiety treatment has the potential to reduce the emergence of secondary mental health disorders and substance abuse (Keesler et al., 2010).

Anxiety often presents outside of a provider's office, in real-life situations, where a provider is unable to provide skills coaching. Mobile health (mHealth) applications (apps) can be used to complement in office treatment by providing an intervention in the patient's natural environment (Gee, Griffiths, & Gulliver, 2016; Heron & Smyth, 2010). The increased portability, computing power, and affordability of mobile technology makes the use of this technology ideal for adolescents. Patients, clinicians, medical organizations, governmental agencies, and third party payers have increasingly recognized the potential for the use of mHealth apps in the treatment of mental health disorders (American Psychiatric Association

[APA], 2019; East & Havard, 2015). However, health care providers encounter challenges in identifying effective apps and deploying the use of mHealth apps in the clinical setting.

Description of the Problem

Health care providers are at the front line of the diffusion of mHealth apps into clinical practice. Even minimal provider involvement with the diffusion of mHealth mental health apps, has demonstrated increased engagement and improved patient outcomes (East & Havard, 2015; Rickwood & Bradford, 2012). Potential advantages to providers that incorporate mHealth apps into their practice include lengthening the time between office visits, increased patient satisfaction, improved treatment adherence, and a means to continue gains after treatment completion (Price et al., 2014). A 2013 survey of more than 2,000 consumers found that 90% of patients said they would download a mHealth app their provider prescribed as opposed to the industry data that suggest only 66% of patients fill a prescription for medicine (Digitas Health, 2013). Even with these potential advantages only 16% of providers have recommended a mHealth app in the clinical setting (Terry, 2015).

Providers interested in incorporating mHealth apps into their treatment plan encounter multiple barriers when attempting to select an app to recommend to their patients. Factors that complicate app selection are the overwhelming number of apps available to consumers, lack of evidence supporting commercially available apps, absence of regulatory oversight, and concerns about compromising patient data (Aungst, Clauson, Misra, Lewis, & Husain, 2014). There are currently over 2,100 apps marketed (iTunes Store & Google Play) to people with anxiety and 121 targeted towards adolescents with anxiety (Bry, Chou, Miguel, & Comer, 2018; Chan, Torous, Hinton, & Yellowlees, 2014). Despite the prevalence of mHealth apps, few high quality studies have been performed to determine the efficacy and acceptability of mHealth apps to

support the management of anxiety in adolescents (Bry et al., 2018; Firth et al., 2017; Kao & Liebovitz, 2017). MHealth apps that help patients with diagnosed psychiatric conditions are currently excluded from regulatory requirements; this absence of regulatory supervision makes it difficult for providers to ensure the accuracy and quality of information provided by mHealth apps (Kao & Liebovitz, 2017; U.S. Food and Drug Administraiton, 2015). Factors that have impeded the integration of apps into practice are the lack of provider knowledge of and comfort with apps, scarcity of guidelines for integration into clinical practice, and that introducing apps may increase provider workload (Aitken & Gauntlett, 2013; Hoffman et al., 2019; Quanbeck et al., 2018; Terry, 2015).

Purpose of the Project

An outpatient adolescent specialty clinic, serving adolescents and young adults (AYA) from 10 to 25 years old, in NC identified a need to facilitate the integration of mHealth apps as adjunctive treatment for adolescents to deal with anxiety symptoms. Although health care providers recommended apps to their patients, these recommendations were based on provider preference and limited information about the app itself.

The purpose of this quality improvement (QI) initiative was to improve practice by developing and implementing a standardized workflow protocol for providers to use when recommending a set of vetted mHealth apps to AYA with anxiety. This multifaceted intervention included the development of a list of recommended apps targeting anxiety symptoms, training to enhance the knowledge and skills of providers for introducing apps to AYA with anxiety symptoms, and a set of resources to inform adolescents about mHealth apps and their potential role in the self-management of anxiety symptoms. The outcome of this

initiative was to increase the proportion of AYA who receive a recommendation from their provider for mHealth apps to augment management of anxiety symptoms.

Review of Literature

Mental health services have been identified as the greatest source of economic burden globally, with the US spending $173 billion in 2015 (Chen, Kuhn, Prettner, & Bloom, 2018). Support for the use of mHealth apps in the treatment of mental health disorders has been widely endorsed by such organizations as the U.S. National Institute of Mental Health, U.S. Department of Health and Human Services, and the World Health Organization (East & Havard, 2015). Delivery of mental health care using mHealth technology has the potential to increase access and engagement to evidence-based interventions (Price et al., 2014). Advantages of mHealth apps include reduction of stigma through anonymity, availability 24 hours a day, customization, decreased demand on clinic resources, and patient empowerment (East & Havard, 2015; Olff, 2015).

Overall, minimal research is available evaluating the efficacy and feasibility of using mHealth apps to augment the treatment of adolescent anxiety symptoms. Two studies evaluating the efficacy of mHealth apps on the treatment of anxiety in AYA 12 to 24 years old had mixed results (Reid et al., 2011; Stallard, Porter, & Grist, 2018). The findings of one study demonstrated a significant reduction in anxiety (Stallard et al., 2018) and the other demonstrated no significant change in anxiety (Reid et al., 2011).

The feasibility of mHealth apps targeting anxiety in adolescents has been more widely studied. Patients and provider report high acceptability and usability (Pramana, Parmanto, Kendall, & Silk, 2014; Stoll, Pina, Gary, & Amresh, 2017). However, the majority of evaluated mHealth apps are primarily in the development stage and have not been released for public use in

the US (Bry et al., 2018; Grist, Porter, & Stallard, 2017; Pramana et al., 2014; Reid et al., 2011; Stallard et al., 2018; Stoll et al., 2017). Support for the use of mHealth apps in the treatment of mental health disorders has been widely endorsed by such organizations as the U.S. National Institute of Mental Health, U.S. Department of Health and Human Services, and the World Health Organization (East & Havard, 2015).

Selection of High Quality mHealth Apps

It is challenging for providers to select high quality mHealth apps to recommend to their patients. There is a gap in the literature supporting the use of any particular commercially available mHealth app to assist in the treatment of anxiety in AYA, but mHealth apps have been identified as an emerging frontier with great promise (APA, 2019; East & Havard, 2015; Kazdin & Blase, 2011). While app marketplaces offer rankings for apps, typically ranging from 0 to 5 stars, these ratings are not indicative of quality (Boudreaux et al., 2014). User ratings often only indicate popularity or longevity that is further complicated by complex algorithms that dictate order of appearance (Boudreaux et al., 2014). Industry, professional organizations, and government agency attempts to present providers with a curated list of critically reviewed mHealth apps have resulted in minimal success (Kao & Liebovitz, 2017; Torous, Powell, & Knable, 2016).

One resource available to persons interested in selecting high quality mental health apps that has showed promise is the website PsyberGuide (2018). PsyberGuide is a non-profit website, supported by The University of California at Irvine and Northwestern University, with the goal of helping consumers and providers make responsible and informed decisions about mental health apps. Currently, this website has an AppGuide of 198 reviewed mHealth apps.

While it does not provide a recommendation of which apps to use, it provides ratings of app credibility, user experience, and transparency (Psyberguide, 2018).

Evaluation Tools

Two evaluation tools that providers can use to locally evaluate the quality of apps they are considering for recommendation to their patients are: (a) the Mobile App Rating Scale (MARS) (Stoyanov et al., 2015), and (b) the American Psychiatric Associations (APA) App Evaluation Model (Torous et al., 2018). The MARS is a 23-item questionnaire to evaluate app engagement, functionality, aesthetics, information quality, and subjective quality (Stoyanov et al., 2015). One limitation of the MARS is that it does not address patient data security (Stoyanov et al., 2015).

The APA App Evaluation Model was developed by the APA's smartphone app evaluation workgroup and the Massachusetts Psychiatric Society's Health Information Technology Committee (APA, 2019). Instead of scoring an app, this tool provides users with a four-stage hierarchical framework or pyramid with safety and privacy as the foundation, followed by evidence, ease of use, and interoperability at the apex of the pyramid (Torous et al., 2018). At the end of each stage the user decides to (a) proceed, (b) proceed with caution, (c) do not proceed (APA, 2019). If the app does not satisfy the users requirements at any stage, the evaluation is stopped and it is deemed that the app should not be recommended (Torous et al., 2018). The goal of this framework is to facilitate shared decision making by the patient and provider (Torous et al., 2018). The APA website does offer examples of use of the model and online evaluation tool for users (APA, 2019).

Integration into Clinical Care

Integrating mHealth apps into clinical care and provider recommendations is integral for use by AYA with anxiety symptoms. Determining how to implement smartphone apps in the clinical setting for patient education is vital (Higgins et al., 2019). A recent study showed short educational sessions demonstrated improvement mHealth app knowledge, comfort, and intention to use (Higgins et al., 2019). There is promise in implementing the use of smart phone apps for patients via an innovative clinical integration program that includes provider training workshops, regular newsletters, practice guides, pocket guides, overview handouts, prescription pads, and marketing materials being piloted by the military currently (Military Health System, 2019; US Department of Veterans Affairs, 2019). A recent study has evaluated both the provider and patient perspective of integrating behavioral health apps in primary care (Hoffman et al., 2019). They developed list of "vetted" apps, agreed on standard language for recommending the apps to patients, created provider resource guides and patient facing behavioral health apps summaries, and created "smart-phrases" to streamline documentation in the electronic medical record (Hoffman et al., 2019). In the pilot study, two-thirds of patients reported that behavioral health apps were helpful (Hoffman et al, 2019). After one-year, 82% of surveyed providers reported they have incorporated behavioral health apps into their clinical practice (Hoffman et al., 2019). These studies provide strong evidence that efforts to increase provide recommendation rates of mHealth apps should focus on involving members of the team throughout the process, creating a list of vetted apps, staff training, creation of educational materials for providers and patients, and standardizing language to use during the patient encounter that make it clear to the patient that the mHealth app is part of the prescribed treatment plan.

The findings of several studies have identified challenges to implementation and provided recommendations for successful integration. Challenges facing patients who received recommendation for apps included low motivation, unfamiliarity with mHealth apps, technical difficulties (low battery, lack of available memory, and poor internet connectivity), and limited health options for non-English speakers (Higgins et al., 2019; Hoffman et al., 2019). Challenges facing providers to introduce apps to patients included lack of time and unfamiliarity with apps (Higgins et al., 2019; Hoffman et al., 2019). Recommendations from these studies included: (a) selected apps should have a clear purpose and be easy to use; (b) clinic staff should be provided additional training regarding the selected apps including how to use the app; (c) providers should use standard language when recommending apps' (d) a "smart-phrases" to streamline documentation should be developed; (e) and to consider digital navigator in the clinic to best assist patients and providers with integration of apps into clinical practice (Digitas Health, 2013; Higgins et al., 2019; Hoffman et al., 2019; Military Health System, 2019).

Summary

Anxiety is a significant issue experienced by many adolescents that often goes under-treated (Keesler et al., 2010; Merikangas et al., 2010). Initiating mental health treatment during adolescence is crucial, because the life time societal cost of such treatment is increased 10-fold when unaddressed symptoms of anxiety emerge before adulthood (Suhrcke, Pilas, & Selai, 2008). Mobile apps are a widely endorsed and cost-effective method to enhance treatment, but widespread integration into daily clinical care has been slow (East & Havard, 2015; Price et al., 2014). Even though adolescents demonstrate willingness to use mHealth Apps, providers have been hesitant due to multiple perceived barriers (Aungst et al., 2014). Studies have shown these barriers can be overcome by ensuring provider involvement early in the selection of approved

mHealth apps, provider training, creating consolidated resource guides/flyers, and standardizing workflow (Aitken & Lyle, 2015; Higgins et al., 2019; Hoffman et al., 2019; Owen et al., 2018).

Theoretical Framework

The Model for Improvement (MFI) guided this QI initiative (Langley, 2009). Indications for selecting the MFI for this initiative were its adaptability, minimal negative impact on current operations, and strength in ensuring a change is an improvement before implementation. It was also the improvement model used for QI at the implementation site. When used correctly the MFI is quite effective at making ideas actionable and linking that action to new knowledge (Langley, 2009). Success of the MFI is accomplished by learning through the building of fundamental knowledge through test cycles regardless of their outcome (Langley, 2009). When using the MFI an implementation cycle should only be performed after sufficient knowledge has been built through test of change cycles.

MFI: Fundamental Questions

The MFI combines a set of three fundamental questions with the Plan, Do, Study, Act (PDSA) cycle: (a) what is trying to be accomplished, (b) how the team will know when a change is an improvement, and (c) what changes will result in improvement (Langley, 2009). The three fundamental questions can also be restated as aim, measure(s), and change idea(s). The aim should be framed as an actionable statement that is clear, specific, measurable, and time-sensitive (Institute for Health Care Improvement [IHI], 2019). Outcome measures assess the performance of the system, process measures assess fidelity to the process, and balancing measures are a way to monitor for degradation of performance in unanticipated areas (IHI, 2019). When developing change ideas, it is imperative to understand current processes and workflow in the setting. Once a thorough understanding is achieved users are encouraged to craft creative solutions or adapt

proven ideas for local change (Langley, 2009). After the three fundamental questions have been answered, then users should enter the PDSA cycle.

The PDSA Cycle

The PDSA cycle is an iterative four-step process to test small scale change and to sequentially build knowledge, before implementation is considered (Langley, 2009). The four steps of the PDSA are Plan, Do, Study, and Act. During the "plan" step, users identify the objective, make predictions (the why), develop a plan to carry the cycle (who, what, where, when), and a plan to collect data (Langley, 2009). During the "do" step, users carry out the plan, document problems and unexpected observations, and begin analysis of data (Langley, 2009). During the "study" step, users perform an analysis of data, comparing measured outcomes to predictions, summarizing lessons learned, and drawing conclusions (Langley, 2009). During the "act" step, users decide to abandon the change, refine the change and test again, or implement the change (Langley, 2009). If a decision to implement is made then users would enter another cycle of the PDSA for implementation (Langley, 2009).

Implementing Change

When a decision to implement is reached the focus of the MFI switches from efficacy and feasibility of the change, to how to cement the change into day-to-day practice (Langley, 2009). Implementation should be carried out through continued use of PDSA cycles of the MFI and it is important to remember that implementation cycles often require more resources and time than testing cycles (Langley, 2009). During implementation emphasis should be on feedback systems and supporting processes (Langley, 2009). Supporting processes can include creating procedures, developing training, and editing job descriptions to name a few (Langley, 2009). The three recommended approaches to implementing change using the MFI, depending

on complexity and risk, are (a) just do it, (b) parallel approach, and (c) sequential approach (Langley, 2009). The just do it approach is recommended when the change is simple and low-risk, but it is important to remember that it will maximize the impact of unforeseen negative outcomes (Langley, 2009). The parallel approach is less risky and is appropriate for more complex changes when current operations cannot be halted (Langley, 2009). Planning phases for implementation is crucial, but this approach does take longer to implement (Langley, 2009). The sequential approach involves sequentially implementing the components of change. Again this approach does require planning and lengthens the implementation time, but significantly reduces the possibility of total failure (Langley, 2009). It is crucial to only progress to implementation after the improvement has proven successful during testing cycles because the effect of failure is much higher during implementation (Langley, 2009).

Specific Aims

The overall aim of this quality improvement initiative was to standardize mHealth app recommendations for outpatient adolescent specialty clinic patients, aged 10 to 25 years old, with symptoms of anxiety through the development and implementation of a standardized workflow protocol based on evidence-based recommendations (Digitas Health, 2013; Higgins et al., 2019; Hoffman et al., 2019; Military Health System, 2019). The primary measure was to increase the percentage of adolescents with symptoms of anxiety who receive an mHealth app recommendation to 100% by the end of the initiative. We hypothesized that, among adolescents with symptoms of anxiety, that a standardized workflow protocol would significantly increase provider mHealth recommendation rates.

Methods

The categories below are based on the recommendations for reporting QI from the Revised Standards for Quality Improvement Reporting Excellence SQUIRE 2.0 (Goodman et al., 2016).

Context

Setting. The setting for this QI initiative was a hospital-based academic adolescent outpatient clinic in NC, staffed by two providers: an adolescent medicine specialist physician and a pediatric nurse practitioner (PNP). Additionally, pediatric residents rotate through the adolescent medicine clinic in one-month blocks, consisting of several adolescent focused experiences including some sessions in the adolescent clinic. Approximately 20 adolescents and young adults (AYA), 10 through 25 years of age, are seen in this specialty clinic weekly.

Patients. Eligible patients included (a) patients currently being treated by any health care professional for anxiety symptoms, (b) screened (at current visit) with Generalized Anxiety Disorder 7-item (GAD-7) and/or Patient Health Questionnaire – Somatic, Anxiety, and Depressive Symptoms (PHQ-SADS), or (c) exhibiting anxiety symptoms including: “feeling nervous, anxious on edge”, “not being able to stop or control worrying”, “worrying too much about different things”, “trouble relaxing”, “being so restless that it’s hard to sit still”, “becoming easily annoyed or irritable”, “feeling afraid as if something awful might happen” (Spitzer, Kroenke, Williams, & Lowe, 2006). Exclusion criteria included patients with suicidal ideation. These patients received standard care from the providers in the clinic.

Interventions

This QI initiative consisted of three interventions: (a) selection of mHealth apps targeting anxiety in adolescents, (b) development of a standardized workflow protocol, and (c)

implementation of the standardized workflow protocol into daily practice in the University of North Carolina (UNC) Adolescent clinic. Baseline data were collected from April 3, 2019 until May 29, 2019. The initiative was launched November 12, 2019 and was complete on February 6, 2020.

The design of this initiative was modeled after the four-step process employed by Hoffman et al. (2019) that demonstrated success in incorporating mHealth apps into an integrated behavioral health clinic. The fourth step of model presented by Hoffman et al. (2019) included the creation of standardized "smart phrases" that would populate the patient's after visit summary (AVS) with mHealth app specific patient education material. Hoffman et al. (2019) had added this step to address lessons learned while piloting their intervention. Since providers in the UNC clinic provide all patients with an AVS before departure the team agreed that this would be an efficient way to provide patients with educational material, as it would conform with current clinic workflow.

Team development. The Doctor of Nursing Practice (DNP) Project Team included (a) the Project lead, (b) the medical director who is an adolescent medicine physician, (c) a PNP who holds a DNP degree and is a provider at the clinic, (d) a PNP who holds a PhD in nursing, and (e) a licensed clinical social worker (LCSW).

Step 1: Selecting mHealth apps. Currently mHealth apps are excluded from regulatory oversight, which creates a significant barrier for providers looking to identify high quality mHealth apps to recommend to patients (U.S. Food and Drug Administraiton, 2015). Creating a list of vetted apps based on early team member input and collected evidence was identified as a crucial first step to successful integration of mHealth apps in prior research (Aitken & Lyle, 2015; Higgins et al., 2019; Hoffman et al., 2019; Owen et al., 2018). The project lead involved

clinic providers through the entire process of mHealth app selection to maintain provider engagement. The team searched for mHealth apps that were: (a) advertised to reduce anxiety available for download from the iTunes Store and Google Play marketplaces, (b) free or the basic product is available and free (special items or upgrades can be purchases as in-app purchases, (c) available in English, and (d) advertised for use by person ages 12 and older. Selection of mHealth apps was performed by searching Psyberguide.org (Psyberguide, 2018), marketplaces (Google Play & Apple Store), web-searches, and gathering input from clinic providers. Twenty-eight apps (Appendix A) were selected for review during the month of June 2019. All apps were downloaded to the project lead's iPhone 6, reviewed, and tested.

An excel spreadsheet was created listing all 28 apps and the following attributes were recorded: cost, credibility, user experience, transparency, email account required, presence of privacy measures (i.e. password, pin), platform, minimum age, available languages, methods used to target/reduce anxiety, emergency resources, comments, and research supporting the mHealth app. Psyberguide.org (2018) was the source of comments about each app including credibility, user experience, and transparency. Members of the team reviewed the spreadsheet and independently tested apps of interest. After the team had time to review the apps a meeting was held to select apps for further review. Upon conclusion of the meeting five apps (1) Calm; (2) HeadSpace; (3) Mindshift CBT; (4) Stop, Breathe, & Think; and (5) Wysa were selected for further review (Appendix A).

The team used the APA App Evaluation model to further evaluate the selected apps for safety and privacy, evidence-base, ease of use, and interoperability. The team used this model to guide their review and were satisfied that each of the five selected apps satisfied their

requirements at each of the four stages. The team approved all five apps for use in the clinic (Appendix A).

Step 2: Standardized workflow protocol development. Standardized workflow protocols have been shown to enhance efficiency, foster a shared mental model, reduce practice variation, and improve outcomes (Coleman & Pon, 2013). The adolescent clinic has many standardized workflow protocols integrated into daily operations. Examples of workflow protocols include patient birth control recommendations, sexually transmitted disease screenings and treatment, and management of eating disorders. The adolescent team desired to enhance their treatment of adolescents with anxiety using mHealth apps. Providers at the clinic had experimented with using mHealth apps to complement provider guided treatment but had not reached a consensus on which apps to recommend, when an app should be recommended, or how to document app recommendation.

The project lead worked with the team to identify components of the standardized workflow protocol. The team concluded that anxiety symptoms that would trigger a mHealth app recommendation, modification of the electronic medical record (EMR) template, development of educational material, and creation of a "smart phrase" to generate the AVS were the highest priority items for their standardized workflow protocol.

The team agreed to use symptoms of anxiety, as identified by the GAD-7, as a trigger for recommending an mHealth app to a patient (Spitzer et al., 2006). Symptoms of anxiety contained within the GAD-7 are provider observation or patient report of "feeling nervous, anxious on edge", "not being able to stop or control worrying", "worrying too much about different things", "trouble relaxing", "being so restless that it's hard to sit still", "becoming easily annoyed or irritable", "feeling afraid as if something awful might happen" (Spitzer et al.,

2006). The GAD-7 is used regularly in this clinic for screening, so provider familiarity with the tool was a major contributor to its selection.

The standard templates in the clinic for initial and follow-up appointments were modified by one of the team members during the pre-launch meeting. The modified template added the following to the end of the Assessment/Plan section of the note:

Does this patient have anxiety symptoms? (Yes/No)

Was a smartphone application recommended? (Yes/No)

Which smartphone application was recommended? (Calm; Headspace; Mindshift; Stop, Breathe, & Think; Wysa; *or free text entry*)

Educational material created by the team included a picture of the app icon, summary of the app, and directions for use. The mHealth app summary and directions for use were created from lessons learned from team members testing the apps and individual app summaries from the Apple Store. The most recent app icons (as of November 11, 2019) were copied and pasted into the educational material. Patient educational material was written in black serif font (Mayer & Villaire, 2007). Only graphics that complemented the text and maximized the use of white space were used (Mayer & Villaire, 2007). All materials were written using an active voice with common words, the pronouns "you" and "we", contractions, and short sentences (Mayer & Villaire, 2007).

This clinic provides all patients with an AVS prior to departure. Patient-facing materials were incorporated into the electronic medical records system so that when providers enter the AVS smart phrase the materials were added to the patient's AVS (Appendix B). This method had the advantage of conforming to current clinic workflow, and ensured patients received education material before departure(Hoffman et al., 2019).

App implementation. Prior to launch baseline data was collected, reviewed, and disseminated to all team members. The week before implementation the project lead met with team members to finalize the modified templates and AVS. The implementation plan was also reviewed with team members to review any concerns. A launch email was sent out prior to launch reinforcing the start date, purpose, goal, template changes, and methods to reach the project lead (Appendix C).

PDSA cycle #1. The PDSA cycle #1 started November 12, 2019. During this cycle providers recommended mHealth apps from the approved list to all patients with symptoms of anxiety seen in the clinic who met inclusion criteria (see above). The intervention consisted of three major steps. First, the providers evaluated patients for symptoms of anxiety and documented anxiety using the updated template in the EMR. Second, the providers partnered with the patient to select app(s) and documented the app(s) recommended in the updated template of the EMR. Third, the providers entered the "smart phrase" in the AVS section, and provided patients with an AVS summary (Appendix B) that included information about the app(s) and recommendations for use.

At the end of the first week, the intervention was evaluated, and lessons learned were discussed with the team. The clinic providers identified a limitation with the new template. There had been some encounters with patients with symptoms of anxiety, but the provider had purposely not recommended a mHealth app. Providers reported that while these patients did have symptoms of anxiety, they were not appropriate due to a developmental delay or other comorbid diagnoses. Additionally, they raised concerns about additional situations where a mHealth app recommendation would not be appropriate such as undergoing mental health treatment with another provider, currently using an app, or acutely ill.

PDSA cycle #2. During the planning stage of PDSA cycle #2 the team discussed modification of the template to include an area for the provider to document the reason why a mHealth app was not recommended. The decision to require providers to document a reason a mHealth app was not recommended at the current encounter meant that mHealth app recommendation would continue to be addressed at future visits. This clever addition meant that providers were making patient centered clinical decisions about mHealth apps at every future visit. The team agreed on the modification and made the correction to the template. The modification is shown below:

Does this patient have anxiety symptoms? (Yes/No)

If yes: Was a smartphone application recommended? (Yes/No)

If no, *free text entry*

If yes: Which smartphone application was recommended? (N/A; Calm; Headspace; Mindshift; Stop, Breathe, & Think; Wysa; *or free text entry*)

Additional planning during this stage also focused on revisiting the fundamental questions for this QI initiative. The team decided to reframe the aim of this QI initiative as the percentage of AYA with symptoms of anxiety where the provider documented a clinical decision regarding mHealth app recommendation 100% of the time. For this QI initiative, a clinical decision was defined as either the provider documenting the recommendation of a mHealth app or the reason(s) why a mHealth app was not recommended within the modified template. The team decided that documentation of a clinical decision regarding mHealth app recommendation better reflected the intent of the QI initiative. The team decided to maintain the proportion of AYA with symptoms of anxiety who received a mHealth app recommendation from their provider. as a secondary outcome measure. A tertiary outcome measure was also developed

during this planning stage. This tertiary outcome measure was to collect the reasons why a mHealth app was not recommended during a clinical encounter as documented in the newly modified template.

The team implemented the changes to PDSA cycle #2 on November 19, 2019. During this cycle providers used the modified template to either document which mHealth app from the approved list was recommend or the reason why a mHealth app was not recommend to AYA with symptoms of anxiety who met inclusion criteria. At the end of the second week the team discussed the modified template; providers were pleased with the ability to easily document reasons for not recommending an app. The team did recognize that medical residents rotating into the clinic were not aware of the QI initiative and providers were having to conduct non-standardized one-on-one education with each individual resident. This was identified as a potential weakness in the standardized protocol and the team decided to act on this lack of awareness during the PDSA cycle #3.

PDSA cycle #3. The team developed a plan to increase awareness and medical resident knowledge of the QI initiative. A one-page flyer describing the QI initiative was created which included the patient criteria for making an app recommendation, how to appropriately document their findings and app recommendations, and a brief overview of the selected mHealth apps (Appendix D). Additionally, the team developed a plan to provide weekly briefs of the QI initiative at the clinic team huddle. The briefs included a synopsis of the QI initiative and the week-to-week status of QI initiative status. The team believed this would raise awareness of the efforts of clinic personnel and celebrate successes of the QI initiative.

The team implemented PDSA cycle #3 changes on November 26, 2019. Medical residents who rotated into the clinic were provided with the newly created educational material.

They reviewed this material and were encouraged to download apps on their personal smartphone to review and test them. One of the clinic providers provided a status update of the QI initiative during the weekly huddle. Data were reviewed and the team decided no further modifications were required at this time.

Measures

The primary outcome measure target for this QI initiative was to increase the proportion of encounters with adolescents with symptoms of anxiety where the provider documented a clinical decision regarding mHealth apps to 100%. The primary outcome measure was defined as (numerator) total number of patient encounters that met inclusion criteria and a clinical decision was documented regarding mHealth app recommendation; (denominator) total number of patients who met inclusion criteria for symptoms of anxiety. The secondary outcome measure was defined as (numerator) total number of patient encounters that met inclusion criteria and received a mHealth app recommendation; (denominator) total number of patients who met inclusion criteria for symptoms of anxiety. The tertiary outcome measure was defined as the text enter by the provider in the free text section after "If no," in the new template created in PDSA cycle #2.

Analysis

The primary and secondary outcome measures were evaluated using a stacked bar chart and a paired t-test to compare pre- and post-intervention (Figure 1 & Table 2). The primary measure was further evaluated using a control chart (Figure 2). The tertiary outcome measure was evaluated by grouping similar responses from the providers as to why a mHealth app was not recommended and grouping their responses into themes. These themes were then presented in a pie chart (Figure 3).

Data Collection

Data were collected and extracted from Epic for all closed patient encounters that took place at the adolescent clinic during the pre- and post-implementation period. Data were collected and reported by the project lead weekly; Microsoft Excel was used for data management.

The only demographic information collected was patient age in years. Other data collected included date of encounter, the primary purpose for the encounter, presence of anxiety symptoms, current anxiety treatment, whether an anxiety screening tool was used during the encounter, name of the recommended app or reason an app was not recommended, and documentation of app recommendation in the AVS.

Ethical Considerations

This QI initiative was deemed exempt on October 21, 2019 by the UNC-Chapel Hill IRB (study #19-2674, Reference ID 2606601).

Results

Prior to launch baseline data were collected and reviewed on all encounters from April 3, 2019 through May 29, 2019. A total of 82 encounters were reviewed. Thirty-seven of these patient encounters had documented symptoms of anxiety (Table 1). Of these 37 patients with symptoms of anxiety, one received a mHealth app recommendation (Table 2). This demonstrated a mHealth app recommendation rate of 3% (Table 2). The only demographic data collected pre- and post-implementation was patient age in years and is presented in Table 1.

During this QI initiative, 57 patient encounters were closed by the adolescent outpatient specialty clinic providers. Of these 57 encounters, clinic providers identified 38 patients that exhibited symptoms of anxiety as defined by the inclusion criteria (Table 1). The number of

AYA with anxiety symptoms that received a mHealth app recommendation after implementation of the QI initiative was 18% ($p<0.05$) (Table 2). During PDSA cycle #2 the template was modified to allow the provider to document why a mHealth app was not recommended. After this addition we were able to track the number of encounters of AYA with anxiety symptoms where providers documented a clinical decision about mHealth apps. This demonstrated an increase in providers documenting a clinical decision regarding mHealth apps for AYA with anxiety symptoms was 76% ($p<0.0001$) (Table 2).

After PDSA cycle #2, documentation of a reason why a mHealth app was not recommended was the most common provider action (Figure 1). Providers could enter any reason for choosing not to recommend a mHealth app. Reasons were compared and categorized into four distinct themes (Figure 3) in order of frequency: (a) anxiety managed by another provider (50%); (b) mHealth app recommendation not appropriate during this specific encounter (27%); (c) patient already using a mHealth app (18%); (d) patient declined a mHealth app (5%).

Table 1: Demographic and baseline data for anxiety symptoms at pre- and post-intervention

	Pre-Intervention N=82	Post-Intervention N=57
Age Range, Years (Mean)	11-20 (15.23)	10-21 (16.28)
Anxiety Symptoms	45.1% (37)	66.7% (38)

Table 2: Summary of mHealth app recommendation rates pre- and post-intervention

Provider	Pre-Intervention (N=37)	Post-Intervention (N=38)	P-value
Recommended app	3%	18%	= 0.0275
Documented decision	3%	76%	< 0.0001

Figure 1: Clinical decision regarding mHealth apps

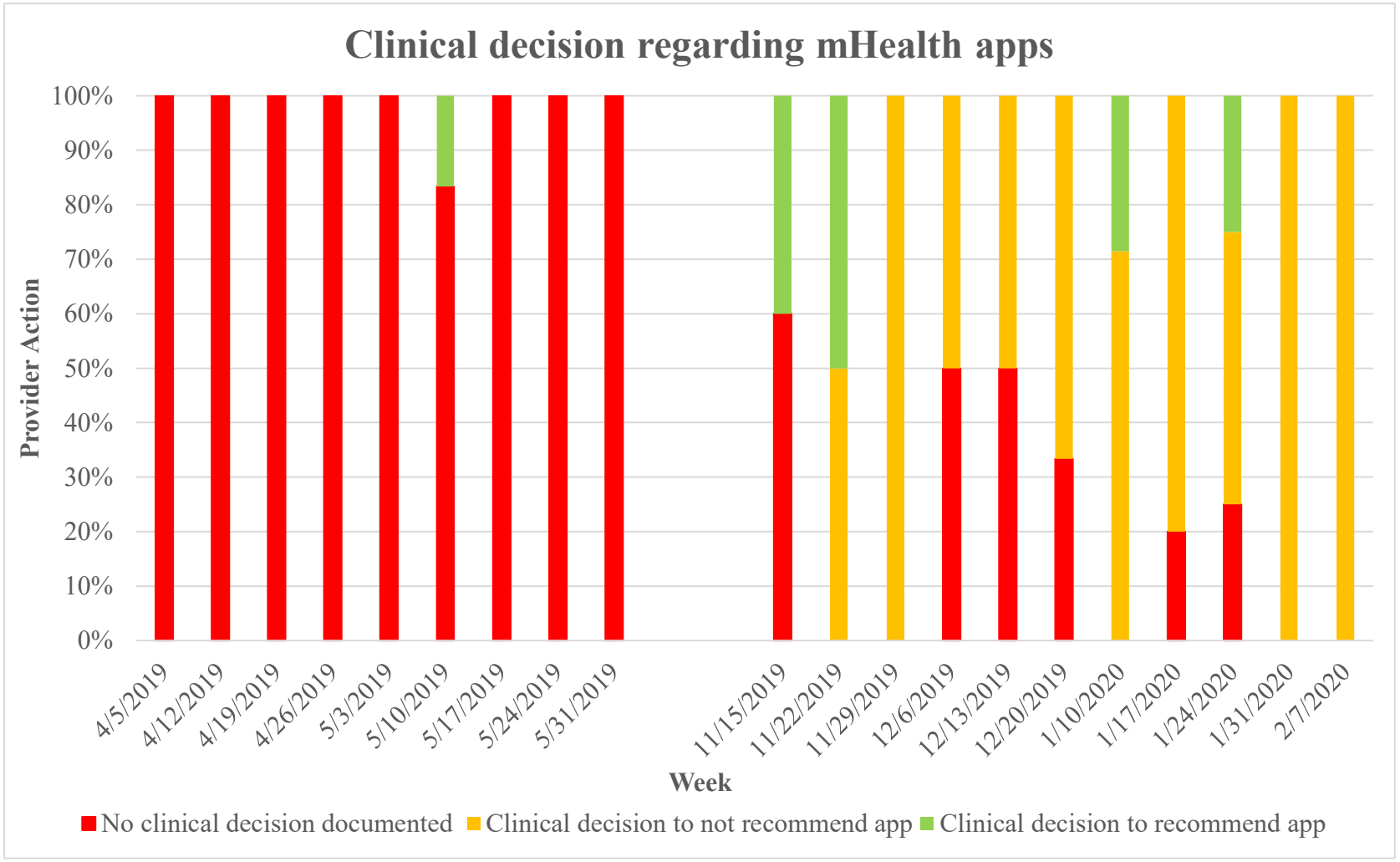


Figure 2: Percentage of AYA with symptoms of anxiety where the provider documented a clinical decision regarding the recommendation of mHealth apps.

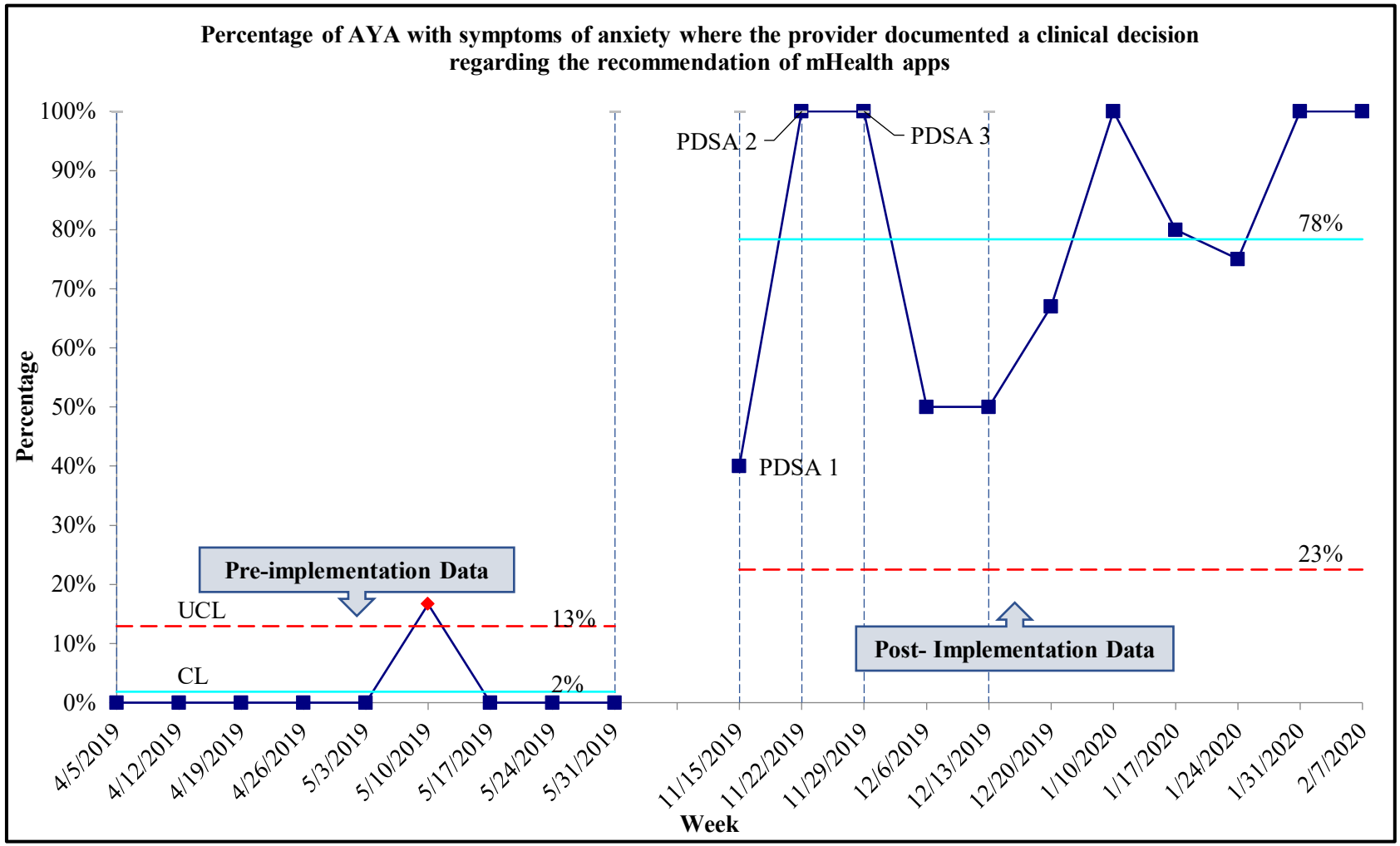
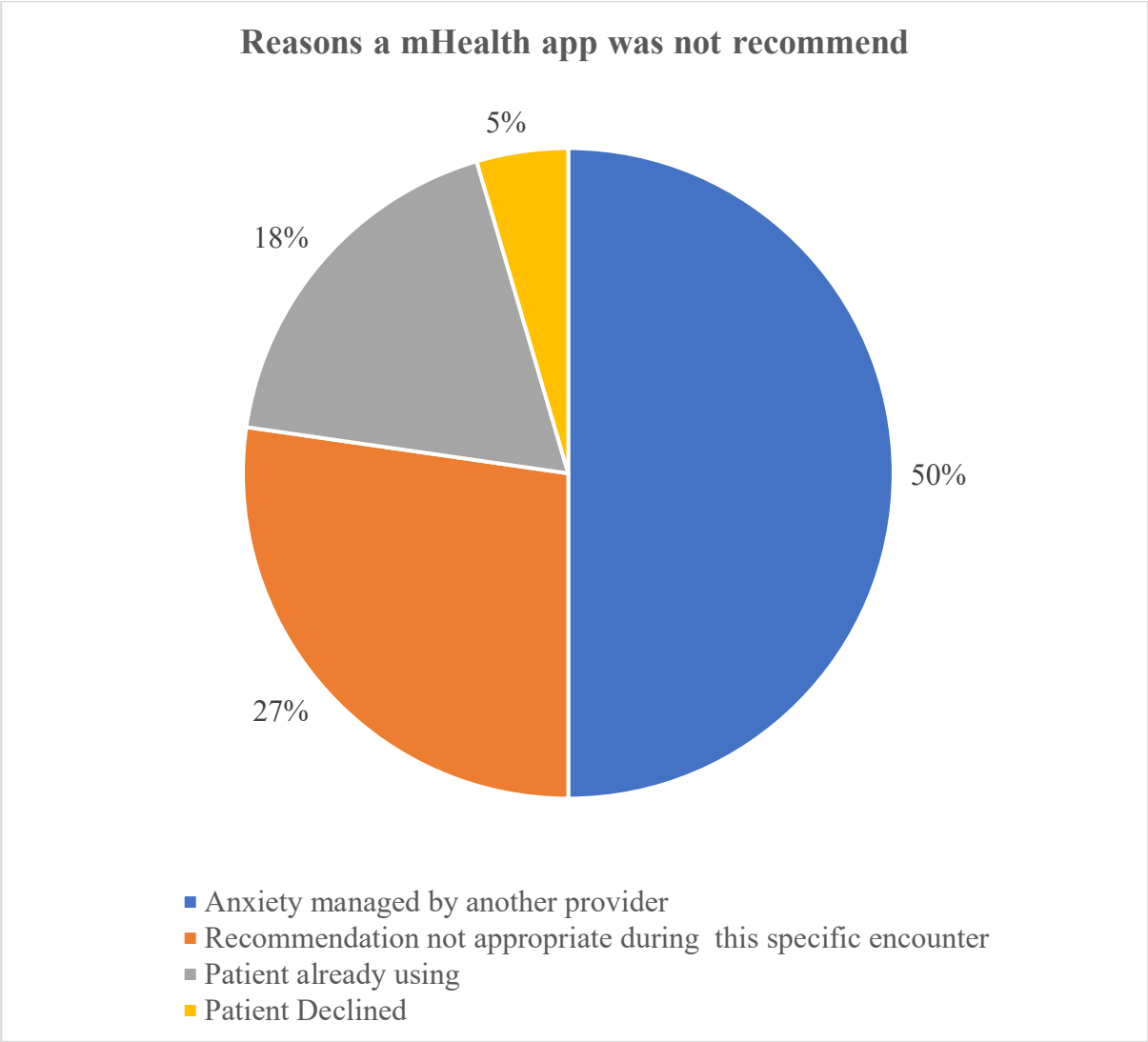


Figure 3: General grouping of documented reason why AYA with anxiety were not recommended a mHealth app.



Discussion

The findings of this QI demonstrated that early provider involvement in the selection of mHealth apps and implementation of a standard workflow protocol increased the frequency of providers including mHealth in the treatment plan for AYA with anxiety symptoms. These interventions resulted in an increase in the percentage of encounters where providers considered and recommend mHealth apps to AYA with anxiety symptoms.

The Model for Improvement (MFI) was an effective framework for this QI initiative, because it encouraged small changes that ran parallel to daily workflow, resulting in minimal impact on daily operations. Performing rapid cycle improvements at one clinic with a small agile team, as suggested by the MFI, supported a "trial and learning" approach through incremental testing of changes. Providers reported that these rapid cycle improvements did not impact their productivity. Additionally, by performing incremental change we were able to keep stakeholders engaged and overcome resistance to change. Stakeholders were presented with the results of the change at the end of each week and were encouraged by the increase in mHealth app recommendation rates after this small change.

Success of this QI initiative was due to a quality-driven clinic team, that were supported throughout the life cycle of the intervention by key stakeholders. Early involvement of all providers in the clinic ensured the QI initiative was feasible in their setting and that they were vested in the selection of mHealth apps and creation of the implemented standard workflow protocol. This QI initiative sought to address the provider difficulty locating quality mHealth apps and workflow disruptions as the most significant barriers to integrating mHealth apps into daily practice, which are the most frequently reported barriers to integration of mHealth apps into clinical care (Aitken & Lyle, 2015; Aungst et al., 2014; Bry et al., 2018; Chan, Godwin,

Gonzalez, Yellowlees, & Hilty, 2017; Higgins et al., 2019; Hoffman et al., 2019). The findings of this QI initiative support the use of this modified process for the selection of mHealth apps, development of a standardized workflow protocol, and implementation of the standardized workflow protocol to address these barriers. This structured approach resulted in careful consideration and selection of quality mHealth apps, development of a process that allowed for seamless introduction of the mHealth apps into clinical practice.

This QI initiative overcame barriers associated with mHealth app selection by improving on the processes reported by two previous studies (Higgins et al., 2019; Hoffman et al., 2019). While Hoffman et al. (2019) argued that mHealth app ratings and large scale curating services were not helpful, the findings of this initiative support that they can be a useful tool to identify mHealth apps for further review. Hoffman et al. (2019) and Higgins et al. (2019) relied on expert consensus for app selection, where we sought a more systematic and reproduceable approach to guide our expert team through final mHealth app selection. By using the APA Application Evaluation Model during our final evaluation we were able to ensure that all team members focused their review on areas of special concern, resulting in increased provider confidence in the safety, security, evidence, and ease of use of selected mHealth apps (APA, 2019). Although this initiative differed on some aspects of mHealth app selection, having an expert multi-disciplinary team was a crucial component to successful mHealth app selection (Higgins et al., 2019; Hoffman et al., 2019).

Hoffman et al. (2019) and Higgins et al. (2019) reduced disruptions of provider clinical workflow by removing providers from the mHealth app recommendation process. In Higgins et al. (2019) patients were approached by volunteers in the waiting room who provided patients with a choice of mHealth apps and received one-on-one instruction. Hoffman et al. (2019)

addressed provider workflow disruptions by having providers refer patients to care managers within the clinic who received special training on the selected apps and used a "smart phrase" to document mHealth app recommendation. While both approaches were successful, they were resource intensive and did not include direct provider involvement. For this QI initiative, the clinic providers believed that the patient-provider relationship made the providers best suited to make a clinical decision regarding mHealth app recommendations. Additionally, direct provider involvement can increase patient adherence to the prescribed treatment plan, with 90% of patients reporting they would download a mHealth app prescribed by their provider (Digitas Health, 2013). Providers in this QI initiative reported that modifications to the template, use of a "smart phrase", and availability of brief patient facing educational material resulted in minimal impact on provider workflow.

The modified primary outcome was to increase the proportion of encounters with AYA with symptoms of anxiety where the provider documented a clinical decision regarding mHealth apps to 100%. This primary outcome emphasized partnering with patients, thereby allowing patients to play a more active role in their treatment plan. This modification ensured that providers were considering mHealth apps as a component of the treatment plan during all encounters with AYA with anxiety symptoms.

This QI initiative has important implications for integrating mHealth apps into daily clinical practice. The Intercontinental Medical Statistics (IMS) Institute for Healthcare Informatics mHealth propose a four step app maturation process that progress from awareness, to providers recommending mHealth apps, to providers prescribing mHealth apps, and culminates in the full integration of mHealth into healthcare delivery systems (Aitken & Lyle, 2015). This QI initiative demonstrated success in addressing the key components of providers prescribing

mHealth apps which are the curation and evaluation of apps, scientific evidence, provider practice buy-in, work-flow accommodations, and best practices. The implementation strategies proposed by this QI initiative provided clinicians with the tools to progress through the third phase of the of the process, laying to the groundwork to full integration. The standardized workflow protocol presented in this QI initiative could serve as model for anyone looking to incorporate mHealth apps into their outpatient clinical setting.

Limitations

This QI initiative had several limitations. This QI initiative was conducted at a single adolescent specialty outpatient clinic staffed by two providers at one academic medical center that is staffed two days a week. Although, the patient flow was limited a longer-term initiative would result in more clinic encounters allowing for a more robust data set. The design of a longer-term initiative would be able to consider patient adherence to provider mHealth app recommendations including the effect of using mHealth app usage on anxiety levels and the consistency of provider clinical decision regarding mHealth app recommendation during subsequent visits.

Sustainability

Sustainability, or the capacity to integrate mHealth apps into this clinical setting, was embedded throughout this QI initiative. The methods to evaluate and select high quality mHealth apps, develop educational material, generate the AVS with a “smart phrase”, and modify templates were created to be reproducible and promote continued growth.

A spreadsheet book was created by the team to standardize the progression through review steps and provide a centralized location to maintain a historical record of mHealth app reviews. The first tab was used for the initial review and prompted the user to answer broad

screening questions about the mHealth app. The second tab of the spreadsheet guided users through the APA Application Evaluation Model. This tab prompts users with questions from the APA Application Evaluation model and records the team's decision to (a) proceed, (b) proceed with caution, or (c) do not proceed for all reviewed mHealth apps. This spreadsheet book is maintained electronically on the clinic's shared drive and will continue to be available to all providers and residents in the clinic.

A standard template was created in Microsoft Word for mHealth app educational material. It is expandable and allows for the inclusion of additional mHealth apps. Mobile health app summaries were brief and could be quickly written based on mHealth app descriptions from the Apple Store and user experience. The "smart phrase" to generate the AVS was created by clinic providers. Members of this clinic are quite comfortable with "smart phrases" and use them in daily practice to streamline documentation. The EMR templates were modified by providers in this clinic. Any future modifications of the template can be performed by clinic providers without requiring any additional training. The creation of educational material for residents and weekly QI huddles will further embed this QI into daily operations and increase sustainment.

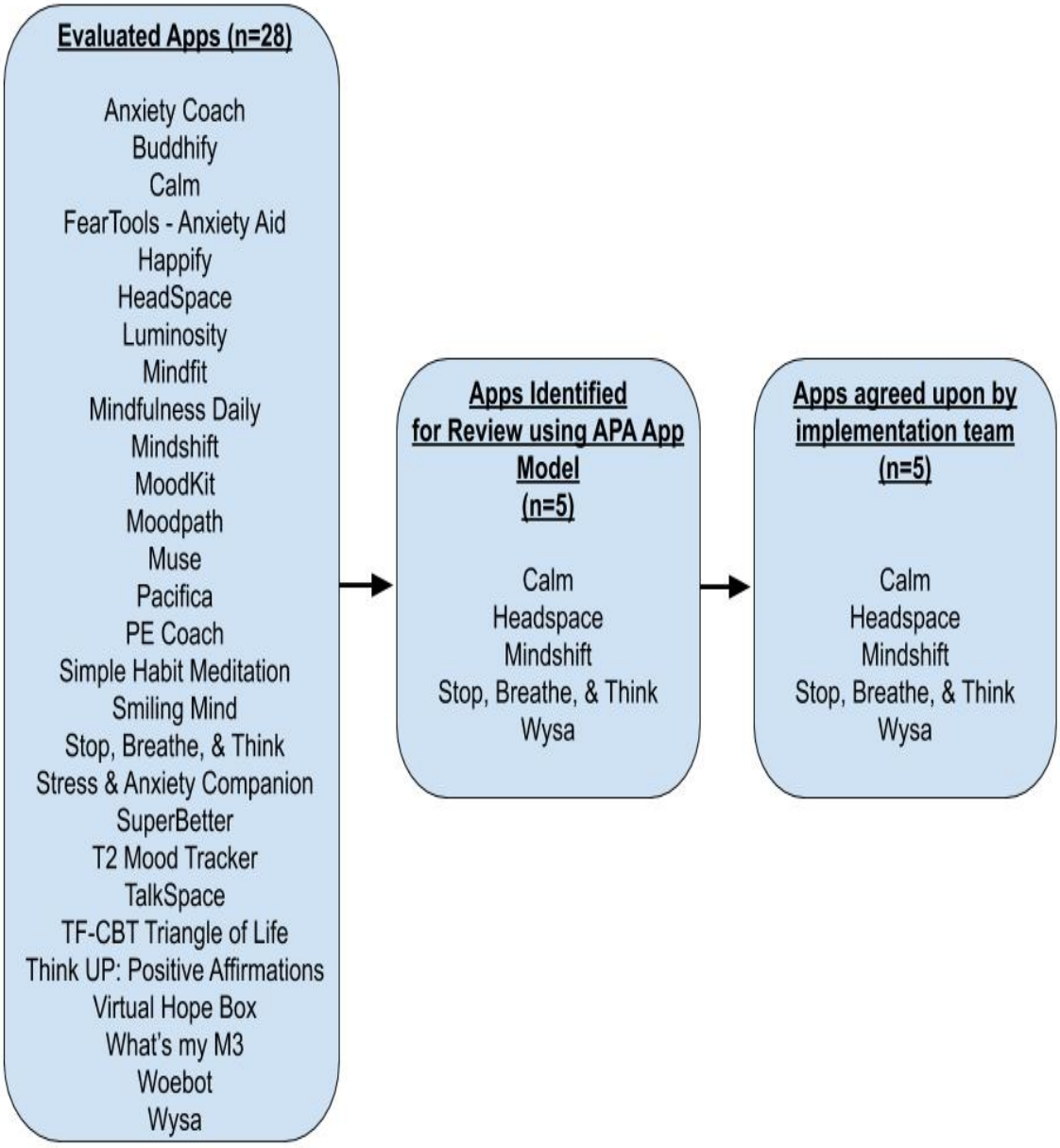
Conclusions

Adolescent anxiety is a significant health concern in NC and throughout the United States (Merikangas et al., 2010; Whitney & Peterson, 2019), that if left untreated can lead to severe mental health disorders in adulthood and considerable societal costs (Keesler et al., 2010). Mobile health apps are an effective evidence-based treatment option for AYA with anxiety, but often go overlooked by healthcare providers due to perceived barriers that can easily be overcome (Aitken & Gauntlett, 2013; East & Havard, 2015; Hoffman et al., 2019; Price et al.,

2014; Terry, 2015). Early provider involvement in the selection of mHealth apps and creation of a standardized workflow protocol was crucial to overcoming perceived barriers to mHealth app recommendations.

This QI initiative resulted in 78% ($p<0.0001$) of providers documenting a clinical decision regarding the inclusion of mHealth apps in the treatment plan for AYA with anxiety symptoms. While the target goal of 100% was not reached, the findings of this QI initiative demonstrated that the implementation of a standardized workflow protocol for providers to use when recommending a set of vetted mHealth apps to AYA with symptoms of anxiety can be an effective method to increase the percentage of encounters where providers make a clinical recommendation regarding mHealth apps.

APPENDIX A: MHEALTH APP SELECTION FLOW CHART



APPENDIX B: AVS EDUCATONAL MATERIAL

Smartphone Apps to Help with Worries/Anxiety

Provider to Adolescent: Today we talked about using smartphone apps to help manage your worries/anxiety. Here is a list of possible smartphone apps you can use.

Calm	***Mindfulness and guided meditation*** ▪ Mindfulness app for beginners, as well as different meditations for anxiety, stress, sleep, and self-care ▪ Guided meditation sessions are available in different lengths anywhere from 3-25 minutes long ▪ It can be helpful if you have trouble sleeping ▪ You can monitor your mood We recommend that you use Calm ***
Headspace	***Mindfulness and guided meditations*** ▪ Learn to relax with guided meditations and mindfulness techniques that bring calm, wellness and balance to your life in just a few minutes a day. ▪ The basics course is free and will teach you how to meditate and how to use mindfulness in everyday life ▪ There are exercises on topics including managing anxiety, stress relief, breathing, happiness, and focus that are 3-10 minutes per session ▪ It can be helpful if you have trouble sleeping. We recommend that you use **Headspace** ***
MindShift	***Tools for anxiety management*** ▪ Helps teens and young adults cope with anxiety. ▪ It allows you to monitor your worries/anxiety and gives tools to manage your worries/anxiety ▪ It can help you change how you think about anxiety. Rather than trying to avoid anxiety, you can make an important shift and face it. We recommend that you use **MindShift** ***
Stop Breathe & Think	***Mindfulness for teens*** ▪ A friendly, simple tool to guide people of all ages and backgrounds through meditations for mindfulness. ▪ A daily check assesses your mood and selects a meditation that is designed for your current mood. We recommend that you use **Stop, Breath & Think** ***

 **Wysa**	***Wysa*** is an emotionally intelligent chatbot that uses artificial intelligence to react to the emotions you express. Unlock tools and techniques that help you cope with challenges in a conversational way. You can use **Wysa** to: ▪ Vent and talk through things or just reflect on your day ▪ Deal with loss, worries, or conflict, using conversational coaching tools ▪ Relax, focus and sleep peacefully with the help of mindfulness exercises We recommend that you use **Wysa** ***

APPENDIX C: LAUNCH E-MAIL

Crosby, William Woodfin

From: Crosby, William Woodfin
Sent: Monday, November 11, 2019 11:30 PM
To: Perry, Martha F; Walters, Elizabeth M
Cc: D'Auria, Jennifer L
Subject: mHealth app recommendation quality improvement initiative -- launches 12 November 2019

Team,

I am excited to announce the launch of our quality improvement initiative starting **12 November 2019**.

Our goal is to a have **100% mHealth app recommendation rate for all patients who report anxiety symptoms.**

The new patient (.mfpnotesadolescent) and follow up template (.mfpnotesadolescentfu) have been updated and now include the following questions:

Does this patient have anxiety symptoms? (y/n)

Was a smartphone application recommended? (y/n)

Which smartphone application was recommended? (N/A, Calm, Headspace, Mindshift, Stop, Breathe, & Think, Wysa, ***)

Additionally, the patient's after visit summary **(AVS) should include the new smartphrase ".MFPAVSANXIETY"**, which includes a list and summary of all applications agreed on by the team.

I will be performing chart reviews weekly and reporting results to the team on Fridays.

Please send me an email when you have issues, success that you believe should be documented, comments from patients, or ideas for change during the next PDSA cycle.

I look forward to continuing to work together with all of you and truly appreciate your hard work, enthusiasm and commitment to this project!

Very respectfully,

William Woodfin Crosby, BSN, RN, CPN

UNC-Chapel Hill, School of Nursing, DNP/PNP Student

(704)530-5782

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APPENDIX D: RESIDENT HANDOUT

The adolescent medicine clinic has implemented a quality improvement initiative to increase provider recommendation rates of smartphone applications (apps) to adolescents with symptoms of anxiety. Our goal is to recommend an app to all patients seen in the adolescent clinic that have symptoms of anxiety. We have reviewed numerous apps and created list of five recommended apps. Our templates have been updated to include questions about presence of anxiety symptoms, if an app was recommended, and which app was recommended. There is a smart phrase for use in the AVS titled ".MFPAVSAPPANXIETY" that should be entered in the after visit summary, so that patients can be provided a list of recommended apps. We recommend that you download these apps on your smartphone and experiment with them in their "free versions." Also, show them to any patient that you are recommending them to.

Recommended Apps for Adolescent Anxiety Symptoms:

Calm: Guides users through mindful meditation in varying lengths from 2 to 30 minutes.

- Is great for patients interested in short meditation sessions.
- Good for touble falling asleep.
- Patients can monitor their mood.
- Be sure to let patients know that the free version is great. There is no need to pay. To get to the free version, "x" out of the subscription window when you first log in. The free options will not have a "lock" in the upper left hand corner.

Headspace: Guides users on how to meditate, breathe, and live mindfully.

- Is great for patients looking for guided meditation.
- Offers the choice of female or male voice for many sessions.
- Session topics include managing anxiety, stress relief, breathing, happiness, and focus.
- Be sure to let patients know that they can access the basics course (10 sessions) and select topics for free. The free options will not have a "lock" next to the title.

Mindshift CBT: Created to help adolescents with common anxiety-provoking situations.

- Is great for worry, test anxiety, social anxiety, performance anxiety, dealing with conflict, panic, and perfectionism.
- Contains a brief anxiety questionnaire to help users pinpoint problem areas.
- Offers thought journaling, belief experiments, creation of a fear ladder, breathing exercises, coping cards to shift thinking, and grounding exercises.
- Access to all features of the app are free, does not require a login, and can be password protected.

Stop, Breathe, & Think: Users identifying thoughts and emotions in the moment while practicing meditative techniques to achieve a relaxed state.

- Is great for patients looking to practice mindfulness.
- Users rate their mood in a unique "check-in" system and the app recommends mindfulness meditation exercises.

- Offers a progress tab where users can track mood over time, number of sessions completed, and time spent meditating.
- Be sure to let patients know that they can access the much of the content for free, but access to premium content does require a subscription. The free options will not have a "lock" on the right side.

Wysa: Users "chat" with an artificially intelligent smartbot to help with their anxiety.

- Is great for patients who may enjoy the texting environment created by this smartbot.
- Guides users through cognitive reframing, breathing exercises, and other strategies based on user input.
- Offers CBT led by AI, positivity exercises (e.g., hug a friend, write happy thoughts), Yoga exercises, exercises (2 or 4 minute workout), and many other tools.
- Be sure to let patients know that they can access the smartbot and much of the content for free, but access to premium content does require a subscription. The free options will not have a "crown" or "lock" on the upper left side.

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